

**REMARKS/ARGUMENTS**

Claims 1-3 were originally filed in the present application. No claims have been amended, added or canceled. Applicants respectfully request reconsideration and allowance of all pending claims in view of the following remarks.

**I. REJECTIONS UNDER 35 U.S.C. §112**

The Examiner has rejected claims 1-3 under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement such that someone skilled in the relevant field of art to make and/or use the invention. Specifically, the Examiner believes the specification of the present application does not provide enough information regarding "the possibility of generating heat from the annihilation process on a macroscopic scale," and thus the Examiner believes that "the claimed invention cannot work properly." The Applicants respectfully disagree.

The description of the invention provides a rather detailed disclosure of the claimed method for converting thermal energy into useful work, theoretical background of the claimed method, namely, the qualitative analysis of the positron state of the Dirac's matter has been made, the types of initiating exposures have been specified for bringing the "working medium – additional low-temperature energy source" system into the quantum-mechanical resonance. The description specifies the mathematics enabling a person skilled in the art (a combustion engineer) to define uniquely the conditions for creating the resonance with the positron state of the Dirac's matter (in this case it is the question of defining the energy density values in the working medium upon the initiating exposure). The description provides the exposure parameters used to bring the system into the quantum-mechanical resonance (varying the external thermodynamic degrees of the system freedom, such as temperature, pressure, chemical composition, external fields).

Exemplary embodiments of the invention have been provided in the description, wherein the heat engine arrangement is disclosed structurally to enable the implementation of its operation according to the claimed method.

Applicants believe that the questions raised by the Examiner regarding the practicability of the claimed invention are due to the fact that rather than analyzing the heat engine operation according to the claimed method, the Examiner has focused on each of the two consecutive cycles taking place during its operation and disclosed in the application. It is obvious from the description of the invention that:

- "the positron state of the Dirac's matter" comprises the positron source;
- applicant proposes no "application of the claimed invention for heating".

Therefore, the claimed method involves using no additional devices for generation of antiparticles (of the accelerator type). In addition, applicant would like to draw the Examiner's attention to the fact that the processes initiated when the method is implemented are directed to providing a temperature difference as a principle of operation of the heat engine rather than generating heat as such.

The efficiency of a heat engine arranged according to the Carnot cycle is known to be determined by a temperature difference between a heat sink and a heat source. The gist of the claimed method is to provide a low-temperature source having practically unlimited thermal capacity in the form of the Dirac's matter positron state initiated in the working medium and to cause the transfer of heat from the substrate to said state.

During the first cycle, the quantum-mechanical resonance of the "working medium – Dirac's matter positron state" system is initiated by the exposures specified in the description. Phase changes take place in the working medium, followed by the transition of a part of the

matter into the positron state of the Dirac's matter and vice versa. As correctly understood by the Examiner, the system is brought into the resonance at a frequency corresponding to  $\gamma$  radiation. During this operation cycle of the heat engine, a number of phase changes occur in the substrate, said changes being in the energy resonance with the electron-positron pair creation (the interaction energy under the resonance is equal to the electron-positron pair creation energy). However, the heat energy leaves the heat engine in the form of  $\gamma$  rays rather than infrared radiation as during heating. This dramatically increases the heat engine efficiency and it is this process that is referred to in the description as the interaction with the positron state of the Dirac's matter. At the same time, the solution according to the claimed invention suggests no use of a  $\gamma$  radiation source. When implementing the claimed method, it is proposed to use the processes taking place in the working medium at the quantum level under the initiating exposure specified in the description.

Therefore, the transfer of energy (initiating exposure energy) from the working medium to the positron state of the Dirac's matter takes place during the first operation cycle of the heat engine according to the claimed method. The above exposures lead to polarization processes in the positron state of the Dirac's matter accompanied with excitation (creation) of particles and antiparticles in the micro-volume of the working medium.

At the same time, one may experimentally observe the  $\gamma$  radiation generated in the course of operation of the heat engine according to the claimed method. Recording of the  $\gamma$  radiation with a wavelength as defined in formula (3) of the description (the value of energy absorbed by the working medium) proves the development of resonance and generation of useful work. The operation of the heat engine according to the claimed method is accompanied with a spontaneous

emission of the  $\gamma$  radiation without the use of any sources including but not limited to radioactive sources.

Therefore, a low-temperature energy source is provided in the working medium by means of bringing the working medium into the quantum-mechanical resonance with the positron state of the Dirac's matter. The transfer of heat from the substrate to the positron state of the matter allows the useful work to be obtained during the first operation cycle of the heat engine.

During the second operation cycle of the heat engine, annihilation of positrons (antiparticles created during the first cycle) with the substrate electrons takes place along with emission of a quantity of energy so that the heat energy content stored in the system decreases making it possible to reduce the heat energy consumption of the external source and to improve the heat engine efficiency. Therefore, applicant suggests no "application of the claimed invention for heating" when using the  $\gamma$  radiation from a source as mistakenly suggested by the Examiner. The implementation of the claimed method involves providing the heat engine enabling the use of processes taking place in the working medium at the quantum level.

## **II. REJECTIONS UNDER 35 U.S.C. §102**

The Examiner has rejected claims 1-3 under 35 U.S.C. §102(b) as allegedly anticipated by U.S. Patent 2,948,861 to Babb. The Applicants respectfully disagree.

As unequivocally stated in the description, claims 1-3 are directed to the use, as a low-temperature energy source in the Carnot cycle, of the positron state of the Dirac's matter characterized by the presence of electron-positron pairs with a zero net charge. Furthermore, claims 1-3 are directed towards the initiation of this state by means of exposure of the working medium to a quantity of energy along with activation of the internal energy resources of the working medium. In other words, the essential features recited in the claims describe providing

a heat engine system enabling the use of the positron state of the Dirac's matter as a low-temperature energy source. The Applicants respectfully assert that the above understanding of the present claims has been overlooked when evaluating the claims for patentability.

Thus, a device as disclosed in Babb wherein the quantum-mechanical resonance is implemented was cited by the Examiner. It should be noted that the quantum-mechanical resonance as a physical phenomenon is inherent in many physical processes and is used in a number of devices, method, circuits. However, the conditions for development of the quantum-mechanical resonance vary in different media. In the device of Babb, the quantum-mechanical resonance is characterized by the microwave region energy (radiation), which is qualitatively different from the processes taking place in the working medium upon implementation of the claimed method. Under such external thermodynamic parameters of the system, and with low energies being characteristic of the device of Babb, no quantum-mechanical resonance may be initiated with the fifth Dirac's state. The Applicants have found the background for determination, and eventually determined, the working medium exposure parameters making it possible to initiate the quantum-mechanical resonance of the working medium with the fifth state of the Dirac's matter as a low-temperature energy source. Thus, the distinction between claims 1-3 and the technique taught by Babb resides in the activation of processes taking place in the working medium at the quantum level along with energy release/absorption.

For at least the above reasons, the cited Babb patent does not disclose all of the elements of claims 1-3. Therefore, Babb does not anticipate the presently pending claims. Accordingly, the Applicants respectfully request that the Examiner withdraw this rejection of claims 1-3.

### III. REJECTIONS UNDER 35 U.S.C. §103

The Examiner has rejected claims 1-3 under 35 U.S.C. §103(a) as allegedly obvious and thus unpatentable over Babb in view of U.S. Patent 6,465,965 to Nelson. Again, the Applicants respectfully disagree.

The failing of the Babb reference are discussed at length above. Looking at the Nelson reference, a device is disclosed for converting energy using the shielding effect. The Applicants are familiar with the shielding theory and the possibility of its practical application. It should be noted that the Examiner makes reference to the section of this source, wherein Nelson describes the theoretical background for the use of shielding effect, handles the fundamental concepts of the quantum mechanics and mentions the Dirac equation. This information is actually theoretical and is known from, including but not limited to, the works by Dirac himself (P.A. Dirac, "The Principles of Quantum Mechanics", fourth edition, OXFORD, 1958). However, like Babb, Nelson also does not disclose the method for converting thermal energy into useful work, wherein the positron state of the Dirac's matter is used as an additional low-temperature energy source.

There is a fundamental difference between the cited references and the foundation of claims 1-3. Nelson analyzes the possibility to obtain additional energy out of "vacuum" (from the fifth state of the Dirac's matter, in the language of the present claims). Unlike the method disclosed in Nelson, the claimed method is directed to providing an interaction with the fifth state of the Dirac's matter ("vacuum") as a source with practically unlimited thermal capacity. The efficiency of the heat engine operating according to the technique recited in the present claims is improved by means of ensuring a maximum temperature difference between a heat sink and a heat source, rather than by means of obtaining additional energy "out of vacuum" as taught in Nelson.

Moreover, the cited combination of references has no expectation of success. More specifically, if, as proposed by the Examiner on page 5 of the present Office Action, the atomic clock according to Babb is "modified" using the theoretical background of the quantum physics set forth in Nelson, this will by no means result in the method(s) recited in claims 1-3, which are based on the Carnot cycle for converting heat energy into useful work with the essential advantages disclosed in the present application. Thus, Applicants respectfully assert that the technical field of the present claims and its purpose have been somewhat overlooked and therefore not taken into consideration while evaluating the present claims against the prior art. Consequently, the combination of Babb and Nelson does not teach or suggest the methods for converting thermal energy into useful work applicable in the heat power engineering, namely, heat engines, as recited in claims 1-3.

Still further, Applicants believe that the technical field of the present claims and their purpose comprise important and inherent information for the examination of the patentability of the claimed method(s). The technical effect attainable by the present claims, namely, to provide an additional low-temperature energy source using the processes which under certain conditions take place in the working medium at the quantum level, has not been taken into account. Therefore, it has not been ascertained in the prior art any essential features of the claims relating to providing the interaction of the working medium with an additional low-temperature energy source, and to using the positron state of the Dirac's matter as an additional low-temperature energy source, which are indicative of the conversion of heat energy into useful work according to the principle of the heat engine operation.

For at least the above reasons, the cited combination of Babb and Nelson does not teach or suggest all of the elements of claims 1-3. As a result, the combination of Babb and Nelson

does not render obvious claims 1-3. Accordingly, the Applicants respectfully request that the rejection of these claims under §103 also be withdrawn.

#### IV. CONCLUSION

The Applicants respectfully submit that all pending claims are in condition for allowance, and request a Notice of Allowability for the pending claims. The Examiner is invited to contact the undersigned Attorney of Record if doing so would expedite the prosecution of the present application.

The three-month deadline for filing a response expired May 20, 2009. Thus, this response is being filed with three-month request for extension of time. Accordingly, the deadline for filing the response is extended to August 20, 2009. If any other fees are determined to be due with the present response, the Applicants hereby authorize the Director to charge the necessary amount, or credit any overpayment, to Deposit Account No. 13-0480, referencing the Attorney Docket Number specified herein.

Respectfully submitted,

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